

24417

S/051/61/011/001/004/006
E036/E435

On the light emission ...

that charged layer effects are seen in TaI and TaBr. Microscopic examination of these effects shows them to be a surface phenomena located near the electrodes, a strong electric field being created in this region. According to H.Kallman (Ref.5: Phys.Rev., 97, 1596, 1955) ultraviolet irradiation during the application of the polarizing field forms a comparatively stable photoelectret, for relatively low polarizing field intensities, when little homogeneous charge was created. It is found under the conditions of the present work that if the ultraviolet irradiation occurs at the same time as the polarizing field is applied, or after its removal, the luminescence during the application of the reverse field is markedly reduced. If the ultraviolet exposure were sufficiently small ($< 10^{-5}$ watt sec/cm²) on applying a field an increase in luminescence occurred, independent of the direction of the field, the Gudden-Pohl effect. For larger exposures, the sharp decrease mentioned above is observed. By illuminating the condenser with ultraviolet light through a negative and subsequently applying the reversed field, an image of the negative is obtained. To explain the main features of this paper the author proposed a tunnelling mechanism in which the conduction band

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On the light emission ...

is tilted during the application of the polarizing field. By this means an electron can be transferred from one activator level to the other by tunnelling into the band and hence to the other level. The internal field in the polarized layer due to non-uniformly distributed charge is such as to retain the electron in the second level indefinitely. The application of the reverse bias tilts the band and the electron tunnels from the second level to the conduction band and then recombines with the hole in the first level emitting radiation. This theory is presented in qualitative terms only but could explain all the data reported. For instance the ultraviolet irradiation causes a double charged layer to form, which partially excites the second type of traps before the reverse field is applied thus reducing the signal. It is expected that all materials showing the effect should exhibit electroluminescence although the converse is not true. I.N.Orlov is thanked for the specimens and for discussion of the results and also I.S.Zheludev for continued interest in the work. There are 5 figures, 2 tables and 7 references: 4 Soviet-bloc and 3 non-Soviet-bloc. The two references to English language publications read as follows:
H.Kallman, B.Rosenberg. Phys.Rev., 97, 1596. 1955;
Card 5/8₅

FRIDKIN, V.M., kand.fiz.-mat.nauk

Physical principles of the electrophotographic process. Vest.
AN SSSR 31 no.3:111-113 Mr '61. (MIRA 14:3)
(Xerography)

FRIDKIN, V.M.

Symposium on the physical bases of the electrophotographic
process. Usp. fiz. nauk 74 no.3:567-570 J1 '61. (MIRA 14:7)
(Xerography)

24048

S/020/61/138/004/008/023
B104/B203

24,7100

AUTHOR: Adirovich, E. I., and Fridkin, V.M.

TITLE: The law of interchangeability and the quasisteadiness of electronic processes in photoelectrets

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 4, 1961, 820-823

TEXT: In the introduction, the authors state that the law of interchangeability in electrophotography has been studied in a great number of papers without solving the theoretical problems of the conditions of its realization in photoelectrets. The inequalities $n \ll |P-N|$; $\partial n / \partial t \ll |\partial P / \partial t - \partial N / \partial t|$ ($0 \leq x \leq 1$) (2) were obtained as necessary conditions. n is the concentration of conduction electrons, N that of the electrons on the adhesion levels, P that of the holes on the activator levels, M_1 that of the activator centers, and M_2 the concentration of the adhesion centers. l is the crystal thickness in the x -direction in which the field is applied, K the dielectric constant, ϵ_1 the binding

energy of the electrons on the local levels of the i -th type. The
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S/020/61/138/004/008/023
B104/B203

The law of interchangeability

necessary and sufficient conditions were only defined for the case of long exposure times, weakly excited donors, and weakly filled-up acceptors; $n(x,t) \ll N(x,t)$ ($0 \leq x \leq 1$) (3). The relations (2) and (3) are different forms of conditions for the quasisteadiness of the concentration of mobile charge carriers. The present paper generally studies the necessary and sufficient conditions for the realization of interchangeability in photoelectrets, and the relationship between the interchangeability and the quasisteadiness of the kinetics of electron processes. The author studies a crystal for which the energy spectrum and the scheme of electron processes are shown in Fig. 1. The kinetics of the electron processes in the exposure of the crystal in an external field E_1 is described by the system

$$\begin{aligned} \frac{\partial p}{\partial t} + \frac{\partial I}{\partial x} &= 0; & \frac{\partial N}{\partial t} &= -k_2 N + \beta n (M_2 - N); \\ \frac{\partial E}{\partial x} &= \frac{4\pi}{\kappa} p; & \frac{\partial P}{\partial t} &= k_1 (M_1 - P) - \alpha n P; \\ q\mu_n E + qD \frac{\partial n}{\partial x} &= j; & \frac{1}{q} p &= P - N - n, \end{aligned} \quad (4)$$

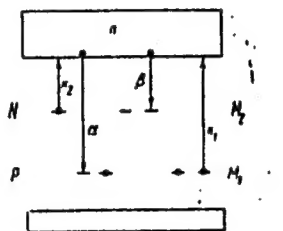
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The law of interchangeability

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where $k_1 = k_1(T, I)$, $k_2 = k_2(T, I)$, and I is the light intensity. The authors formulate the boundary and initial conditions, and subsequently represent, without limitation of the generality, the functions n and j and the transition probabilities k_1 and k_2 in the form $n = I n_g$; $j = I j_g$; $k_1 = s_1 I$; $k_2 = s_2 I$. Here, n_g and j_g are new unknown functions of x and z , and also, possibly of the parameter I . s_1 and s_2 depend, in the general case, on I and T . Thus, the system

$$\begin{aligned} \frac{\partial \rho}{\partial z} + \frac{\partial j_g}{\partial x} &= 0; & \frac{\partial N}{\partial z} &= -s_2 N + \beta n_g (M_2 - N); \\ \frac{\partial E}{\partial x} &= \frac{4\pi}{x} \rho; & \frac{\partial P}{\partial z} &= s_1 (M_1 - P) - \alpha n_g P; \\ q_1 n_g E + q D \frac{\partial n_g}{\partial x} &= j_g; & \frac{1}{q} \rho &= P - N - I n_g. \end{aligned} \quad (8)$$



(8)

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The law of interchangeability

is obtained for (4). On the premise that (a) for all types of local levels the rate of thermal production of free charge carriers is negligibly small as compared to the rate of optical production ($s_1 = \text{const}$; $s_2 = \text{const}$, and that (b) the terms with I_n may be neglected in (8), the condition for the realization of interchangeability is satisfied: $Q = \int dx \approx q \int [P(x, z) - N(x, z)] dx = Q(z)$ (9). The first of the above conditions reads exactly:

$$I \gg 2 \left(\frac{2\pi n k T}{h^3} \right)^{1/2} e^{-\epsilon/kT} \frac{\alpha}{s_1}, \quad I \gg 2 \left(\frac{2\pi m k T}{h^3} \right)^{1/2} e^{-\epsilon/kT} \frac{\beta}{s_2},$$

(11)

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The law of interchangeability ...

In a thorough investigation, the authors derive the inequalities $I \ll \beta M_2/s_1$, $I \ll \beta M_2/s_2$, $I \ll (\beta M_2)^2/4 \pi q \mu_1 M_1$ (15), and prove that (11) and (15) are the necessary and sufficient conditions for the realization of interchangeability in the polarization of a photoelectret. Similarly, it can be shown that these conditions also hold for the realization of interchangeability in the depolarization of a photoelectret. Another equivalent representation of these conditions reads:

$n(x, t) \ll N(x, t); \partial n(x, t)/\partial t \ll \partial N(x, t)/\partial t / (0 \leq x \leq l; t > 10/\beta M_2)$. There are

1 figure and 11 references: 10 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Fizicheskiy institut imeni P. N. Lebedeva Akademii nauk SSSR (Institute of Physics imeni P. N. Lebedev of the Academy of Sciences USSR). Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)

Card 5/6

hh:152

S/181/62/004/010/056/063
B102/B104

247700

AUTHORS: Fridkin, V. M., and Barulin, Yu. N.

TITLE: Iso-opacity of layers of amorphous selenium with additions of sulfur

PERIODICAL: Fizika tverdogo tela, v. 4, no. 10, 1962, 2978 - 2979

TEXT: Amorphous selenium in photoelectret state is known to be depolarized by illumination as well as by adsorption of negative ions. Continuing earlier studies (DAN SSSR, 145, 1, 1962; 143, 4, 1962) the authors investigate the depolarization kinetics of layers of amorphous selenium containing up to 33% sulfur. The iso-opacity curves (Fig. 1) were drawn for one and the same magnitude of surface charge Q and for various amounts of S. The presence of adhesion levels causes the iso-opacity curves to become bent upward at $I = I^*$ where $I^* \approx \beta_e M_e / s_e$; β_e is the carrier trapping cross section, s_e the cross section of interaction of the adhesion levels with photons, and M_e the adhesion level concentration. For the measurements the Se-S mixture was deposited in vacuo onto an Al base of 40°C; the rate Card 1/2

Iso-opacity of layers...

S/181/62/004/010/056/063
B102/B104

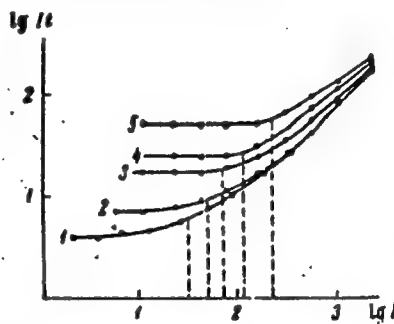
of deposition being $1\mu/\text{min}$ and the layer thickness $\sim 20\mu$. The layer was charged by positive ions in a corona discharge, after which the layer was illuminated by a standard incandescent lamp while the decrease of the surface charge with time was being measured. The light intensity was modified by a filter and measured with a luxmeter. As may be seen from Fig. 1, the point $I=I^*$ is shifted to the right with increasing S-concentration. M. I^* increases linearly with M. There are 2 figures.

ASSOCIATION: Institut kristallografii AN SSSR, Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: June 8, 1962

Fig. 1. Legend: (1) pure Se; (2) 3wt% S; (3) 7wt% S; (4) 13wt% S; (5) 33wt% S.

Fig. 1



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ADIROVICH, E.I.; FRIDKIN, V.M.

Failure of the reciprocity law in electric photography and forms of
isocapacity. Zhur.nauch.i prikl.fot. i kin. 7 no.3:187-194 My-Je '62.
(MIRA 15:6)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR. i Institut
kristallografi AN SSSR.

(Xerography)

FRIDKIN, V.M.

Possible form of isopacity in the electrophotographic process on
ZnO layers. Zhur.nauch.i prikl.fot.i kin. 7 no.4:304-306 J1.
Ag '62. (MIRA 15:8)

1. Institut kristallografii AN SSSR.
(Xerography)

FRIDKIN, V.M.

Reports on electrophotography made at the International Colloquium
on Scientific Photography in Zurich. Zhur.nauch.i prikl.fot.i kin
7 no.4:316-320 J1-Ag '62. (MIRA 15:8)
(Xerography) (Photography--Congresses)

ZHELUDZEV, I.S.; TIKHOMIROVA, N.A.; FRIDKIN, V.M.

Ferroelectric properties of triglycine sulfate at high hydrostatic pressures. Kristallografiia 7 no.5:795-797 S-0 '62. (MIRA 15:12)

1. Institut kristallografii AN SSSR.
(Ferroelectric substances) (High-pressure research)

247800

40576

S/070/62/007/005/013/014

E132/E460

AUTHORS: Gul', V.Ye., Lushcheykin, G.A., Fridkin, V.M.

TITLE: Electrets from elastic polymers

PERIODICAL: Kristallografiya, v.7, no.5, 1962, 797-799

TEXT: The production of electrets by the orientation of molecules in an electric field while the specimen is heated and cooled is well-known. However, the production of electrets by cross-linking (vulcanization) has hitherto not been described. The possibilities of forming very high stability electrets by this method are obvious. For these experiments natural rubber with the usual content of vulcanizing compounds (100 parts by wt. rubber, 3 parts sulphur, 1 part mercaptobenzothiazol, 5 parts ZnO) but without a filler. The mixture was vulcanized in a press under a pressure of 70 kg/cm² between sheets of Al foil which were insulated from the press by 6 to 8 layers of cellophane. Fields of 5 to 10 kV/cm were applied during the process. Heterocharges were formed for low fields and homocharges for higher fields. The change of heterocharge with time could be expressed by

$$s = s_1 \exp(-t/\tau_1) + s_2 \exp(-t/\tau_2)$$

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E132/E460

Electrets from elastic polymers

where $\tau_1 = 110$ min and $\tau_2 = 10^4$ min. The heterocharge is thus due to two mechanisms, the first dipole orientation (relaxation time τ_1) and the second the macroscopic displacement of the ions the long relaxation time of which (τ_2) is due to the high specific resistance of the material. The production of charges of the same sign on both sides of the sheet can be explained by the different numbers of positive and negative ions moving towards the electrodes. Besides the surface charging the piezomodulus was also measured. The latter was found to be directly proportional to the surface density of the charge and reached a value of 10^{-7} c.g.s.u. The full time of vulcanization was 30 min at 143°C . After vulcanization, specimens could not be electrified and it is clear that the electrets are locked in by the vulcanization. There are 3 figures.

ASSOCIATIONS: Moskovskiy institut tonkoy khimicheskoy tekhnologii
im. M.V.Lomonosova (Moscow Institute of Fine Chemical
Technology imeni M.V.Lomonosov)
Institut kristallografii AN SSSR (Institute of
Crystallography AS USSR)

SUBMITTED: January 16, 1962
Card 2/2

32815
S/020/62/142/001/011/021
B104/B102

5.5330
AUTHORS:

Belavtseva, Ye. M., and Fridkin, V. M.

TITLE:

Electrophotographic method in electron microscopy

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 1, 1962, 67-68

TEXT: Electrophotographs of electron beams (accelerating voltage, 60 kv) were directly taken by a JEM-100 (UEM-100) electron microscope. The instrument was adapted to serve both as an electron microscope and as an electron diffraction apparatus. Amorphous selenium layers applied on metal backings (6.9 cm) were used as electrophotographic films. They were positively charged in the dark by a corona discharge in air. After the usual exposure in the electron microscope, the films were developed using a dry developer. Electrophotographs were obtained with both adaptations of the apparatus. These provisional experimental results prove that electrophotographs can be taken directly with an electron microscope. The selenium plates used were as sensitive as ordinary diapositive plates. The current density of the electron beam hitting the plate ranged between 10^{-8} and 10^{-11} a/cm². Above 10^{-8} a/cm², the plates

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S/020/62/142/001/011/021

B104/B102

Electrophotographic method ...

were depolarized completely, and no pictures could be taken. A. Ye. Kriess and I. S. Zheludev are thanked for interest. There are 2 figures and 6 references: 3 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: W. D. Oliphant, *Discovery*, 15, 182 (1954); R. G. Vyverberg, H. E. Claro, I. H. Dessauer, *Nondestructive Testing*, 13, 35 (1955); M. Ardenne, *Progr. IV Intern. Congress Electron. Mikr.*, September, 1958, Berlin, 1959. X

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental Organic Compounds of the Academy of Sciences USSR), Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)

PRESENTED: August 1, 1961, by A. V. Shubnikov, Academician

SUBMITTED: July 31, 1961

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24.2600

S/020/62/143/004/012/027
B104/B102

AUTHOR: Fridkin, V. M.

TITLE: The isoopacity in electrophotography

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 4, 1962, 825 - 828

TEXT: In general the isoopacity is described by

$$dz/dI = \frac{1}{In} \int_0^z \left\{ n - I \frac{\partial n}{\partial I} \right\} dz, \text{ where } z = It, I - \text{light intensity, } t - \text{time,}$$

n - conduction electron density (V. M. Fridkin et al., DAN, 138, no. 4, 820 (1961); Zhurn. nauchn. i prikl. fotografii i kinematografii, 6, 33, 233 (1961); 7, no. 2 (1962)). This equation is determined from the condition $K_1^T \gg \beta_1 M_1$ for a nonquasistationary case and contradicts the lifetime of photoelectrets and that of dark decays of the charge of an electrophotographic layer experimentally observed. K_1^T is the thermal component of the ejection probability of an electron from local or activator levels
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✓B

The isoopticity in ...

S/020/62/143/004/012/027
B104/B102

into the conduction band; β_1 is the adhesion probability; M_1 is the adhesion-level density. If in the crystal deep adhesion levels only (K_1^T

$\langle\langle\beta_1 M_1\rangle\rangle$ exist, the excitation of the crystal may be nonquasistationary.

In this case, from the above equation an isoopticity equation may be derived which corresponds to experimental data. The depolarization of a crystal is discussed in detail. There are 2 figures.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)

PRESENTED: December 11, 1961, by A. V. Shubnikov, Academician

SUBMITTED: November 1, 1961

Card 2/2

FRIDKIN, V.M.; BARULIN, Yu.N.

Two mechanisms of the formation of latent electrophotographic images. Dokl.AN SSSR 145 no.1:78-81 J1 '62. (MIRA 15:7)

1. Institut kristallografii AN SSSR. Predstavleno akademikom A.V.Shubnikovym.

(Photoelectricity)

FRIDKIN, V. M.*, ZHELUDEV, I. S., ABDULGAMIDOV, I. S.,

"Testing of photoelectret conditions in activating alkali halogen crystals."

report to be submitted for the 1st Intl. Congress on Reprography, Cologne,
West Germany, 14-19 Oct 1963

* also submitted:

- * . . . with BUGHYENKO, V. I., "Electrophotography on silver chloride crystals."
- * . . . with ANFILOV, I. V., "The present state of development in the electro-
photographic field."

L 19472-63

EWP(q)/EWT(m)/EWP(B)/BDS

AFTTC/ASD JD

ACCESSION NR: AT3002248

S/2941/63/001/000/0353/0359

AUTHORS: Fridkin, V. M. ; Nosov, V. N.

TITLE: The role of barrier contact in radiation mechanism of ZnS-films ²⁷⁻²⁷ 18 ~~18~~ B

SOURCE: Optika i spektroskopiya; sbornik statey. v. 1: Lyuminesentsiya. Moscow, Izd-vo AN SSSR, 1963, 353-359

TOPIC TAGS: kinetics, ion, negative charge, corona discharge, quenching

ABSTRACT: The kinetics of radiation in a negatively charged film of ZnS-Cu, Cl was investigated, first under the action of direct electrical impulses of variable duration and then under an opposing field of linearly increasing potential. The negative ionic charge on the film was produced by corona discharge in air. Furthermore, to study the relation between quenching and electron redistributions in energy levels, the film was charged and pre-irradiated by the above time-dependent opposing electric field with linearly increasing potential. Curves were obtained for radiation intensity as a function of time with different, positively charged, variable impulses and linearly increasing potential as parameters. The results are interpreted by means of a concept whereby the adsorbed ions on the film surface form a space charge. The presence of this space charge then forms a surface

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ACCESSION NR: AT3002248

barrier. This is connected to ions in ionization levels by means of electrons tunneling through the surface barrier (first transition) and to radiation centers (third transition). "The author is grateful to I. N. Orlov, F. F. Vol'konshteyn, A. M. Bonch-Bruyevich, and I. S. Zheludev." Orig. art. has: 8 figures.

ASSOCIATION: none

SUBMITTED: 20Jan62

DATE ACQ: 19May63

ENCL: 00

SUB CODE: PH

NO REF SOV: 007

OTHER: 003

Card 2/2

S/181/63/005/001/057/064
B104/B186

AUTHOR: Fridkin, V. M.

TITLE: Peculiarities of longitudinal photoconductivity of crystals with strong absorption

PERIODICAL: Fizika tverdogo tela, v. 5, no. 1, 1963, 353-356

TEXT: On the basis of studies by K. Hecht (Zeitschr. f. Phys., 77, 235, 1932), F. Stöckmann (Zeitschr. f. Phys., 128, 185, 1950), B. Gudden and R. Pohl (Zeitschr. f. Phys., 16, 170, 1923), more general expressions for the dependence of the primary photocurrent on the field strength are studied:

$$i = \frac{qWn_0}{d} \int_0^d e^{-\frac{x}{a}} \left(1 - e^{-\frac{x}{W}} \right) dx =$$

$$= \frac{qWn_0}{d} a \left[1 - e^{-\frac{d}{a}} - \frac{W}{a+W} \left\{ 1 - e^{-\frac{a+W}{a} \left(\frac{a+W}{a} \right)} \right\} \right], \quad (1)$$

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Peculiarities of longitudinal...

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$$i^+ = \frac{qWn_0}{d} \int_0^d e^{\frac{1}{a}(s-d)} \left(1 - e^{-\frac{s}{W}}\right) dx =$$

$$= \frac{qWn_0}{d} a e^{\frac{1}{a}d} \left[e^{\frac{d}{a}} - 1 - \frac{W}{W-a} \left\{ e^{\frac{d}{a} \left(\frac{W-a}{W} \right)} - 1 \right\} \right]. \quad (2).$$

$W = \mu\tau E$ is the carrier shift in the band, n_0 is the concentration of free carriers, and q is the elementary charge. These expressions show that in the general case $i^+ > i^-$, i.e., the photocurrent is unipolar. For weak light absorption ($d/a \ll 1$) this unipolarity disappears and the formulas (1)-(2) become identical with those developed by Hecht. If the absorption is strong ($d/a \gg 1$) and the condition $T/\tau \gg 1$ is fulfilled the expressions (1)-(2) assume the form

$$i^- = \frac{qn_0^2}{d} \frac{W}{a+W}, \quad (6)$$

$$\frac{i^+}{i^-} = 1 + \frac{W}{a}. \quad (8).$$

$$i^+ = \frac{qn_0^2}{d} W, \quad (7)$$

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Peculiarities of longitudinal...

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Eq. (8) shows that unipolarity increases proportionally with the field strength E . At the same time i^- depends nonlinearly on E . This is explained as follows: the linearity criteria $W/d \ll 1$ and $W/a \ll 1$ for the photocurrents i^+ and i^- are different in the general case. For $a = 2\mu$ and $\mu\tau = 10^{-7} \text{ cm}^2/\text{v}$, the curves calculated from (1) and (2) are in good agreement with the experimental values obtained for anthracene by H. Kallmann and M. Pope (J. Chem. Phys., 32, 1, 300, 1960). There is 1 figure.

ASSOCIATION: Institut kristallografii AN SSSR, Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: September 21, 1962

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S/181/63/005/001/058/064
B104/B186

AUTHORS: Fridkin, V. M., and Belikova, G. S.

TITLE: Photodepolarization of some crystals of aromatic hydrocarbons

PERIODICAL: Fizika tverdogo tela, v. 5, no. 1, 1963, 356-358

TEXT: The depolarization of a number of charged hydrocarbon crystals (anthracene, phenanthrene, stilbene, tolane, naphthalene) was found to be unipolar on irradiation in the fundamental absorption band. The crystal surfaces were charged by adsorption of positive and negative ions from corona discharges in the air. The photodepolarization curves were determined with a dynamic electrometer and a low-frequency oscillograph. The depolarization of all crystals except that of naphthalene was proved to be unipolar. Phenanthrene, stilbene, and tolane mainly have p-type conductivity, whereas anthracene has both p-type and n-type conductivity. All crystals are photoconductive also outside the fundamental absorption band, but in these regions unipolarity could not be proved. According to H. Kallmann, B. Rosenberg (Phys. Rev., 97, 1596, 1955), W. Moore, and M. Silver (J. Chem. Phys., 33, 1671, 1960), the photoconductivity of

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Photodepolarization of some...

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anthracene is caused by the production of free holes and is extrinsic. The activation energy of the impurity levels was measured to be 1.8 ev. The formation of the photoelectret state is assumed to be due to these levels. The results are not in contrast to the mechanism of photoconductivity according to which free carriers are produced by diffusion of excitons from the volume to the surface. There are 1 figure and 1 table.

ASSOCIATION: Institut kristallografii AN SSSR, Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: September 21, 1962

Card 2/2

L 13357-63

EW(1)/BDS AFFTC/ASD

ACCESSION NR: AP3001267

S/0181/63/005/006/1523/1527

AUTHOR: Fridkin, V. M.; Barulin, Yu. N.

52
51

TITLE: Nonlinear character of photopolarization (photodepolarization) in layers of amorphous selenium

SOURCE: Fizika tverdogo tela, v. 5, no. 6, 1523-1527

TOPIC TAGS: photopolarization, photodepolarization, electron, hole, Se, lifetime, drift mobility

ABSTRACT: The authors have made experimental studies of curves showing nonlinear-photodepolarization of layers of amorphous selenium. Measurements were made on layers of amorphous selenium 20 microns thick sprayed in a vacuum on an aluminum base. The charge on the layers, positive or negative, was produced by corona discharge in air. Change of potential with time in an illuminated layer was recorded by a dynamic electrometer connected with an ENO-1 low-frequency oscillograph at its output. Illumination was made by each of six mercury lines. Curves were drawn relating potential change to time,

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ACCESSION NR: AP3001267

and from these the product of drift mobility times lifetime was computed for both holes and electrons. Curves of equal opacity were also drawn, and from these the concentration of levels of hole distribution was determined, along with the corresponding activation energies. Variations in the drift mobility-lifetime product with wave length were observed, and since drift mobility does not vary with wave length, the effect must be due to lifetime of the carriers. The lifetime of holes was observed to decrease with increase in wave length. The lifetime of electrons was found to behave in opposite fashion. The difference in spectral dependence of lifetimes for holes and electrons may be due to the limitation of the lifetime of holes to recombination with free electrons, whereas the lifetime of electrons is determined chiefly by their occurrence at deep levels and on the surface of the layer. Orig. art. has 1 figure, 1 table, and 7 formulas.

ASSOCIATION: Institut kristallografi AN SSSR, Moscow (Institute of Crystallography, Academy of Sciences, SSSR)

SUBMITTED: 20Dec62

DATE ACQ: 01Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 005

OTHER: 006

Card 2/2

L 18575-63 EWP(j)/EPF(c)/EWT(1)/EWP(q)/EWT(m)/BDS AFFTC/ASD/ESD-3/IJP(C)
 Pc-4/Pr-4 JAJ/RM/WM/JD/MAY

ACCESSION NR: AP3001301

S/0181/63/005/006/1735/1737

AUTHORS: Belikova, G. S.; Kusev, V. G.; Fridkin, V. M.

TITLE: Nonlinear photodepolarization of crystals resulting from a space-charge-limited photocurrent

SOURCE: Fizika tverdogo tela, v. 5, no. 6, 1963, 1735-1737

TOPIC TAGS: photodepolarization, carrier, space charge, volt-ampere characteristic, photocurrent, drift, mobility, dielectric constant, injection, I, N, anthracene, corona discharge

ABSTRACT: This work is a continuation of earlier work on nonlinear photodepolarization produced by relatively large displacement of carriers. In the present work it is shown that the relative potential, V/V_0 , depends on initial potential, V_0 , in inverse fashion however, diminishing more rapidly as the value of V_0 rises. To test this conclusion, the authors investigated the photodepolarization of single crystals of anthracene on the surface of which positive ions of nitrogen have been adsorbed from corona discharge in air. The method has the advantage of excluding injection of carriers into the crystal. The technique

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L 18575-63

ACCESSION NR: AP3001301

2
has been described in detail in previous papers (V. M. Fridkin, Yu. N. Barulin, FTT, 4, 2982, 1962; DAN SSSR, 145, 1, 78, 1962). Measurements were made on a plate of anthracene with an area of about 2 cm² and a thickness of 0.3 cm, cut parallel to the (001) face. Depolarization of the crystal was effected by illumination in monochromatic light having a wave length of 405 mμ. Results show that V/V_0 declines more rapidly with increase in V_0 and that the relation deviates somewhat from that predicted by the theoretical derivation; i.e., the space-charge-limited photocurrent obeys the square law. The deviation in theoretical and experimental values may be explained by variations in degree of refinement of specimens or by the presence of shielded space charge, the radius of shielding being as great as the thickness of the crystal specimen. Tests made at different intensities of light show agreement with results of other authors. Orig. art. has: 2 figures and 5 formulas.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography, Academy of Sciences, USSR); Institut fiziki Bolgarskoy Akademii nauk, Sofia (Institute of Physics, Bulgarian Academy of Sciences)

SUBMITTED: 01Feb63

DATE ACQ: 01Jul63

ENCL: 00

SUB CODE: PH

NO REF SOV: 003

OTHER: 006

Card 2/2

L 19567-63

EWP(q)/EWT(m)/EWP(B)/BDS AFFTC/ASD JD

ACCESSION NR: AP3007519

S/0181/63/005/009/2709/2711

AUTHOR: Tikhomirova, N. A.; Fridkin, V. M.

TITLE: Photoconductivity of sulfur single crystals at high hydro-
static pressures 27 10

SOURCE: Fizika tverdogo tela, v. 5, no. 9, 1963, 2709-2711

TOPIC TAGS: sulfur photoconductivity pressure dependence, sulfur
single crystal photoconductivity, sulfur photoconductivity, crystal
photoconductivity

ABSTRACT: A strong increase in the photoconductivity of sulfur
single crystals under pressures up to 10,000 atm in an environment
of isopentane was observed and investigated. Specimens in the form
of plates about 1 mm thick and 0.5 cm square were placed in a conden-
ser and illuminated through a quartz window by an incandescent lamp
outside the pressure chamber. The resulting longitudinal photocur-
rent was plotted against applied voltage at various pressures, and
the pressure dependence of the photocurrent was seen to be nearly
exponential. The voltage dependence of the photocurrent turns non-
linear at high pressures and tends to saturation at high field

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L 19567-63

ACCESSION NR: AP3007519

intensities. These phenomena demonstrate an increase in carrier life and an increase of the stationary secondary photocurrent through the crystal. The measurements of the dependence of the photodepolarization current on the illumination time of the crystal in an electric field revealed that the dependence is exponential and that the saturation level rises with the pressure. It is noted that the relaxation time is nearly independent of the pressure, since the secondary photocurrent apparently does not substantially affect the kinetics of photopolarization. It is concluded that even an insignificant narrowing of the forbidden zone under pressure may result in a sizeable change of lifetime of photocurrent carriers, which is supported by Rose phenomenology theory. Orig. art. has: 2 figures.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography, AN SSSR)

SUBMITTED: 22Apr63

DATE ACQ: 14Oct63

ENCL: 00

SUB CODE: PH

NO REF SOV: 003

OTHER: 005

Card 2/2

45109
S/077/63/008/001/002/003
A066/A126

24 7000
5.11.70

AUTHOR: Fridkin, V.M.

TITLE: The general form of iso-opacity of an electrophotographic process

PERIODICAL: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, v. 8,
no. 1, 1963, 36 - 41

TEXT: In analogy to the iso-opacity of photochemical processes, the electrophotographic iso-opacity of a silver halide crystal is defined as the dependence of the logarithm of exposure It (I = light intensity, t = exposure time), whereby a definite charge Q of the crystal is depolarized, on the logarithm of I . If the law of reciprocity is satisfied, iso-opacity can be represented as a straight line parallel to the abscissa. E.I. Adirovich and V.M. Fridkin (Zh. nauchn. i prikl. fotogr. i kinematogr., 1962, 7, 187) derived the integrodifferential equation

$$\frac{dz}{dI} = \frac{1}{In} \int_0^z \left[n - I \frac{\partial n}{\partial I} \right] dz, \quad (1)$$

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S/077/63/008/001/002/003
A066/A126

The general form of iso-opacity of an

which, in general, is satisfied by the shape of the iso-opacity curve. Here, $z = It$, and n denotes the conduction electron density. Proceeding from the condition $k_1^T \approx \beta_1 M_1$, those authors derived an iso-opacity equation for the non-quasi-steady case, which contradicts both the experimental lifetimes of photoelectrets and the charge decay times of electrophotographic layers in the dark. M_1 is the adhesion level density, β_1 is the adhesion probability, k_1 and k are the probabilities of an electron being ejected from local and activator levels, respectively, into the conduction band. Thus one obtains

$$k_1 = k_1^O + k_1^T; \quad k = k^O + k^T; \quad (3)$$

$$k_1^O = s_1 I; \quad k^O = sI; \quad (4)$$

$$k_1^T = 2 \beta_1 \left(\frac{2\pi mkT}{h^2} \right)^{3/2} e^{-\epsilon_1/kT}; \quad (5)$$

$$k^T = 2\alpha \left(\frac{2\pi mkT}{h^2} \right)^{3/2} e^{-\epsilon/kT}, \quad (6)$$

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The general form of iso-opacity of an

S/077/63/008/001/002/003
A066/A126

where ϵ_1 and ϵ denote the activation energies for the ejection of an electron. It is shown here that, if $k_1^T \ll k_1 M_1$, i.e., if there are only deep adhesion levels in the crystal, the excitation of the crystal will be non-quasi-steady, and that the iso-opacity equation obtained from (1) and

$$\begin{aligned} \frac{dn}{dt} &= k (M - P) + k_1 N_1 - \beta_1 n (M_1 - N_1) - \alpha n P ; \\ \frac{dN_1}{dt} &= -k_1 N_1 + \beta_1 n (M_1 - N_1) ; \\ \frac{dp}{dt} &= k (M - P) - \alpha n P ; \\ P &= N_1 + n \end{aligned} \quad (2) \quad \checkmark$$

is consistent with experimental data. Here, N_1 is the electron density on the adhesion levels, P is the hole density on the activator levels, M is the activator level density, and α is the recombination probability. The iso-opacity curve is shown in Figure 2. $k_1 = s_1 I \ll k_1^T$ is valid within the section $0 < I <$

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S/077/63/008/001/002/003
A066/A126

The general form of iso-opacity of an

$< I_1$; $k_1^0 = s_1 I \approx k_1^T$ within $I_1 < I < I_2$; $k_1^0 = s_1 I \gg k_1^T$, $k_1 \approx k_1^0 \ll \beta_1 M_1$
within $I_2 < I < I_3$; $k_1 \approx k_1^0 \approx \beta_1 M_1$ within $I_3 < I < I_4$; and $k_1 \approx k_1^0 \gg$
 $\gg \beta_1 M_1$ within $I > I_4$. There are 2 figures.

ASSOCIATION: Institut kristallografi AN SSSR (Institute of Crystallography AS USSR)

SUBMITTED: December 3, 1961

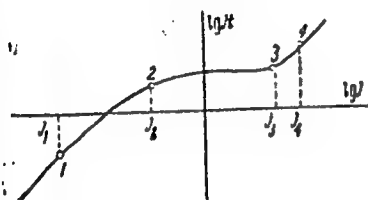


Figure 2: General form of iso-opacity of an electrophotographic process ($k = 0$).

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ACCESSION NR: AP3000741

S/0020/63/150/003/0511/0514

AUTHOR: Bugriyenko, V. I.; Fridkin, V. M.

TITLE: Electrophotographic isopaques of AgCl single crystals

SOURCE: AN SSSR. Doklady, v. 150, no. 3, 1963, 511-514

TOPIC TAGS: electrophotographic isopaques, electrostatic photography, silver chloride isopaques

ABSTRACT: The form of the depolarization isopaques for AgCl single crystals with different concentrations of colloidal silver has been investigated. Plastically deformed crystals were used in the form of foil 0.25 mm thick heat treated at 400C for 6 hr. The concentration of colloidal silver was regulated by exposures to white light from an SVDSh-250 lamp, after which absorption curves at room temperature were plotted. The photoelectret condition was created by photopolarization at the temperature of liquid nitrogen in a field of 3 kv/cm with monochromatic light of 365-millimicron wavelength. The polarization was carried out by exposures to green light

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ACCESSION NR: AP3000741

of various intensities. In confirmation of results obtained earlier by Maykiyar (P. V. Maykiyar, DAN, 31, 226 (1941)), it was found that exposure increases cause increases of both the concentration and the size of silver particles. The increase in particle size is characterized by deviation from the mutual substitution law, the particle diameter at a given energy growing smaller with higher light intensities. The results, in general, confirm an earlier suggestion by Fridkin (V. M. Fridkin, DAN, 143, 825 (1962)) concerning the mechanism of the breakdown of mutual substitution in the formation of latent electrophotographic images within the high light-intensity range and explain the same phenomenon in experiments by Maykiyar. The theory of Mott and Gurney, therefore, remains valid without any special qualifications. Also, the analogy between latent photographic and latent electrophotographic images in silver halide compounds appears to go deeper than was previously assumed. The paper was presented by Academician A. V. Saubnikov on 28 December 1962. "The authors thank L. P. Mel'nichuk for assistance in the measurements." Orig. art. has: 1 formula, 1 table, and 3 figures.

Card2/3

ACCESSION NR: AP3000741

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova
(Odessa State University); Institut kristallografi Akademii nauk SSSR
(Institute of Crystallography, Academy of Sciences SSSR)

SUBMITTED: 25Dec62 DATE ACQ: 21Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 008 OTHER: 004

Card 3/3

FRIDKIN, V.M.; BUGRIYENKO, V.I.

Electron mechanism underlying deviations from the law of reciprocal substitution in silver halide crystals. Dokl. AN SSSR 152 no.6: 1346-1349 0 '63. (MIRA 16:11)

1. Institut kristallografi AN SSSR. Predstavleno akademikom A.V. Shubnikovym.

BELAVTSEVA, Ye. M.; FRIDKIN, V. M.

"Die Anwendung der Elektrofotografie in der Elektronenmikroskopie."

report submitted for 3rd European Regional Conf, Electron Microscopy,
Prague, 26 Aug-3 Sep 64.

FRIDLAND, Vladimir Markovich; IVANOVA, Ye.N., doktor sel'khoz.
nauk, otv. red.

[Soils and weathering surfaces of humid tropics as revealed
by a study in North Vietnam] Pochvy i kory vyvetrivaniia
vlazhnykh tropikov; na primere Severnogo V'etnama. Moskva,
Izd-vo "Nauka," 1964. 311 p. (MIRA 17:5)

GRIGOR'YEV, G.I.; FRIDLAND, V.M.

Classification of soils according to the degree of cultivation.
Pochvovedenie no.5:1-14 My '64. (MIRA 17:9)

1. Pochvennyy institut imeni Dokuchayeva, Moskva.

ACCESSION NR: AP4011734

S/0181/64/006/001/0035/0042

AUTHORS: Fridkin, V. M.; Abdulgamidov, S. A.

TITLE: Photoactivation and the photoelectret state of single crystals of potassium dichromate

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 35-42

TOPIC TAGS: photoactivation, photoelectret, potassium dichromate, photocurrent yield, absorption band, intrinsic absorption band

ABSTRACT: The photoactivation of potassium dichromate involves the fact that with illumination of the crystal the photocurrent yield increases in the intrinsic absorption band. After prolonged illumination, saturation is reached, and further illumination brings no increase in photocurrent output. The authors have investigated the connection between the photoelectret state and photoactivation in single crystals of potassium dichromate. The dependence of photocurrent with time for different photoelectret charges and the thermal decay of photoconductivity are shown diagrammatically in Figs. 1 and 2 on the Enclosures. The authors also studied the dependence of photocurrent yield on the intensity of light. They found that the nature of this dependence changes substantially with change in

Card 1/1

ACCESSION NR: AP4011734

photoactivation of the crystal. At maximums of photoactivation (saturation) the photocurrent yield depends linearly on the light intensity, but at rather low photoactivation the dependence is quadratic. The authors conclude that the measurement of photoelectret charge is a convenient method permitting one to determine the concentration of current carriers at trapping levels and, even more, to gain information concerning the mechanism of photoactivation. "The authors express their thanks to A. V. Shubnikov for his constant interest in the work and for his discussions of the results and to M. K. Sheynkman for useful discussions and a number of valuable suggestions." Orig. art. has: 6 figures, 1 table, and 7 formulas.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography AN SSSR)

SUBMITTED: 20Jun63

DATE ACQ: 14Feb64

ENCL: 02

SUB CODE: PH

NO REF SOV: 010

OTHER: 001

Card 2/4

ACCESSION NR: AP4019835

S/0181/64/006/003/0764/0770

AUTHORS: Abdulgamidov, S. A.; Zheludev, I. S.; Nosov, V. N.; Fridkin, V. M.

TITLE: On internal field distribution in single crystal photoelectrets

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 764-770

TOPIC TAGS: internal field distribution, single crystal, photoelectret, photoelectric field, interelectrode spacing, space charge, field distribution

ABSTRACT: The hetero- and homocharge distributions in photoelectrets of single crystals of additive-colored KCl, S, $K_2Cr_2O_7$ and CdS have been investigated, using the light probe technique of M. Y. Ben Sira, B. Pratt, E. Harnik, and A. Many (Phys. Rev. 115, 55, 1929) and Harnik, Ben Sira, Pratt, and S. Peter (J. Appl. Phys., 34, 207, 1963). It consists of depolarizing the photoelectret by means of a light probe in a direction perpendicular to the internal photoelectric field. The KCl specimen was polarized first by a 0.5-kv field with exposure of the whole crystal surface to 546m monochromatic light, and subsequently by a 2.0-kv field with central illumination only. Internal field distributions are represented graphically as functions of the interelectrode spacing. Both barrier type and space

Card 1/2

ACCESSION NR: AP4019835

charge type distributions are observed. For the central illumination case an asymmetric field distribution was noticed relative to the crystal center. Similar experiments were performed on the rest of the specimens. In CdS, under all polarization time durations, the field showed an inverse direction at the cathode and a forward, positive direction at the anode. Orig. art. has: 6 figures and 3 formulas.

ASSOCIATION: Institut kristallografi AN SSSR Moscow (Institute of Crystallography AN SSSR)

SUBMITTED: 29Aug63

DATE ACQ: 31Mar64

ENCL: 00

SUB CODE: PH

NO REF SOV: 006

OTHER: 006

Card 2/2

L 8661-65 EWP(a)/EWP(b) LJP(c)/ASD(a)-3/ETC(a)/RAEM(c)/RAEM(l)/RAEM(t)/AFMD(t)

JD

ACCESSION NR: AP4046637

S/0181/64/006/010/3153/3155

AUTHOR: Pospelov, V. V.; Fridkin, V. M.

TITLE: The mechanism of hetero- and homo-charge formation in single crystal AgCl photoelectret

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3153-3155

TOPIC TAGS: photoelectret, silver halide recording medium, optical transmission, photocurrent, depolarization, ultraviolet irradiation

ABSTRACT: Single crystals of AgCl, grown by the Bridgman method and then rolled into slabs, were subjected to four groups of measurements. (1) The optical transmission spectrum was measured at room temperature and the position of the colloidal-silver band was found. Then the spectra of the direct (2) and depolarization (3) photocurrents were determined. These first three groups of measurements were carried out before and after ultraviolet irradiation. They showed

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L 8664-65

ACCESSION NR: AP4046637

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that the heterocharge was formed at levels of colloidal silver, precipitated by the photolytic action of u.v. irradiation. The last group (4) of measurements was concerned with the nature of the homocharge formed on the surface of AgCl on absorption of negative oxygen ions, positive nitrogen ions, or cold-emission electrons. The results indicated that the surface homocharge was the result of penetration of electrons into the interior of AgCl crystals and filling of colloidal-silver levels. "The authors thank F. F. Vol'kenshteyn and V. F. Kiselev for their interest and G. F. Dobrzanskiy for supplying AgCl crystals." Orig. art. has: 2 figures.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography, AN SSSR)

SUBMITTED: 20Apr64

ENCL: 00

SUB CODE: 88, EM

NR REF SOV: 005

OTHER: 000

Card 2/2

ACCESSION NR: AP4012275

S/0070/64/009/001/C063/0068

AUTHORS: Abdulgamidov, S. A.; Fridkin, V. M.

TITLE: Photoconductivity and the photoelectret state in single crystals of potassium dichromate

SOURCE: Kristallografiya, v. 9, no. 1, 1964, 63-68

TOPIC TAGS: photoconductivity, photoelectret, potassium dichromate, unipolar conductivity, volt ampere characteristic, lux ampere characteristic, photosensitivity, photopolarization, ultraviolet light, hole mobility, charge density

ABSTRACT: The purpose of the present study has been to discover the possibility of unipolarity in the conductivity of $K_2Cr_2O_7$. The setup for experimental work permitted measurement in a vacuum (10^{-5} mm Hg) at room temperature and at the temperature of liquid nitrogen. Crystal plates were cut along $[001]$ 1-2 mm thick and 1 sq cm in area. Photoconductivity was observed in both the ultraviolet and the visible part of the spectrum ($\lambda = 436 \text{ m}\mu$), and the current was observed only when a positive potential was impressed on the illuminated electrode. Illumination of different faces did not seem to change the photoelectric current (or the photo-

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ACCESSION NR: AP4012275

polarization). It was found that prolonged illumination caused saturation, and after a few seconds no increase in photosensitivity occurred. The lux-amperes characteristics, as expected, proved to be highly linear. A study of the volt-amperes characteristics showed a current saturation at about 600 v. This suggests a primary characteristic of the photoelectric current. The displacement of a single hole was found to be equal to $\mu\tau \sim 10^{-5} \text{ cm}^2/\text{v}$ (μ = mobility and τ = lifetime of a hole). The maximum charge of the photoelectret, obtained by integrating the discharge current with respect to time, proved to be $\sim 10^{-8} \text{ coul/cm}^2$. With increase in polarizing field, the charge density of the photoelectret increased. "The authors express their sincere thanks to Academician A. V. Shubnikov for proposing this topic and for discussing the results of the work." Orig. art. has: 6 figures.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography AN SSSR)

SUBMITTED: 09Apr63

DATE ACQ: 19Feb64

ENCL: 00

SUB CODE: PH

NO REF SOV: 006

OTHER: 005

Card 2/2

BR

ACCESSION NR: AP4043192

S/0070/64/009/004/0564/0565

AUTHORS: Abdulgamidov, S. A.; Zheludev, I. S.; Fridkin, V. M.

TITLE: On the kinetics of the formation of the photoelectret state in additively colored KCl single crystals

SOURCE: Kristallografiya, v. 9, no. 4, 1964, 564-565

TOPIC TAGS: potassium compound, photoelectret, single crystal, color center, F center, polarization, depolarization

ABSTRACT: The tests were made with single crystals having an F-center concentration $\sim 10^{16} \text{ cm}^{-3}$ with an aim at checking on the theoretical deductions of E. Adirovich (Fiz. tv. tela v. 3, no. 7, 2048, 2050, 1961). The measurements were made with plates having area $\sim 1\text{--}2 \text{ cm}^2$ and thickness $\sim 0.15 \text{ cm}$, using barrier contacts to prevent the injection of the carriers from the electrodes into the

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ACCESSION NR: AP4043192

crystal (mica liners). Illumination during the polarization was with monochromatic 546-nm light. The charge was measured by the depolarization method, with the photoelectret illuminated with the undecomposed light from a mercury lamp and with integration of the depolarization current. The time variation of the photoelectret charge was found to be exponential. The reciprocity law was fulfilled over the entire range of light intensity employed. The charge density was found to be linear in the polarizing-field intensity. It is concluded on the basis of these results, and also results by others, that the kinetics of formation of the photoelectret state in colored alkali-halide crystals, as well as their depolarization, are in accord with the deductions of the phenomenological theory. "The authors thank L. M. Shamovskiy for supplying the samples of additively colored single crystals." Orig. art. has: 1 figure.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of

Card 2/4

ACCESSION NR: AP4043192

Crystallography, AN SSSR)

SUBMITTED: 01Nov63

ENCL: 01

SUB CODE: OP, SS

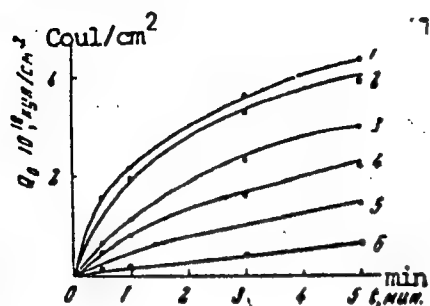
NR REF SOV: 002

OTHER: 004

Card 3/4

ACCESSION NR: AP4043192

ENCLOSURE: 01



Dependence of the charge of a photoelectret on the illumination, following illumination by different light intensities (additively colored single crystal KCl, $T = 120K$). The numbers refer to different illuminations.

Card 4/4

ABDULGAMIDOV, S.A.; ZHEIUDEV, I.S.; FRIDKIN, V.M.

Kinetics of the formation of the photoelectret state in
additively colored KCl single crystals. Kristallografiia
9 no.4:564-565 J1-Ag '64.

(MIRA 17:11)

1. Institut kristallografi AN SSSR.

MEKHANIZM VZNIKNIENIYA FIZICHESKIH, V.M.

Mechanism underlying the formation of heterocharges and
homocharges in photoelectrets from LiNbO_3 single crystals.
Fiz. tver. tela 6 no.10:3153-3155 O 1964. (V.94 17 2)

1. Institut kristallografiy AN SSSR, Moskva.

KISELEV, V.F.; POSPELOV, V.V.; FRIDKIN, V.M.

Spectral curves of the depolarization of silver chloride crystals.
Zhur. nauch. i prikl. fot. i kin. 9 no.5:357-359 S-O '64.

(MIRA 17:10)

1. Institut kristallografii AN SSSR i Fizicheskii fakul'tet
Moskovskogo gosudarstvennogo universiteta imeni Lomonosova.

L 41241-65 EWT(m)/EPF(c)/EPF(n)-2/EWA(d)/T/EMP(t)/EMP(k)/EMP(b)/EWA(c)
 PE-4/Pr-4/Pu-4 LJP(c) JD/KJ/JG
 ACCESSION NR: AP3000741

S/0020/63/150/003/0511/0514

37
33
B

AUTHOR: Bugriyenko, V. I.; Fridkin, V. M.

TITLE: Electrophotographic isopaque of AgCl single crystals

SOURCE: AN SSSR. Doklady, v. 150, no.3, 511-514

TOPIC TAGS: electrophotographic isopaque, electrostatic photography, silver chloride isopaque

ABSTRACT: The form of the depolarization isopaque for AgCl single crystals with different concentrations of colloidal silver has been investigated. Plastically deformed crystals were used in the form of foil 0.25 mm thick heat treated at 400C for 6 hr. The concentration of colloidal silver was regulated by exposures to white light from a SVDSH-250 lamp, after which absorption curves at room temperature were plotted. The photoelectret condition was created by photopolarization at the temperature of liquid nitrogen in a field of 3 kv/cm with monochromatic light of 365-millimicron wavelength. The polarization was carried out by exposures to green light of various intensities. In confirmation of results obtained earlier by Meyklyar (P. V. Meyklyar, DAN, 31, 226 (1941), it was found that exposure

Card 1/2

L 41341-65

ACCESSION NR: AP3000741

4

increases cause increases of both the concentration and the size of silver particles. The increase in particle size is characterized by deviation from the mutual substitution law, the particle diameter at a given energy growing smaller with higher light intensities. The results, in general, confirm an earlier suggestion by Fridkin (V. M. Fridkin, DAN, 143, 825 (1962)) concerning the mechanism of the breakdown of mutual substitution in the formation of latent electrophotographic images within the high light-intensity range and explain the same phenomenon in experiments by Mayklyar. The theory of Mott and Gurney, therefore, remains valid without any special qualifications. Also, the analogy between latent photographic and latent electrophotographic images in silver halid compounds appears to go deeper than was previously assumed. The paper was presented by Academician A. V. Shubnikov on 28 December 1962. "The authors thank L. P. Mel'nichuk for assistance in the formula measurements." Orig. art. has: 1 table and 3 figures.

ASSOCIATION: Odeasskiy gosudarstvennyy universitet im. I. I. Mechnikova (Odessa State University); Institut kristallografii Akademii nauk SSSR (Institute of Crystallography, Academy of Sciences SSSR)

SUBMITTED: 25Dec62

ENCL: 00

SUB CODE: S!

NO REF SOV: 008

OTHER: 004

ATD PRESS: 2026

Card 2/2

L 58927-65 ENT(1)/ENT(m)/T/ENP(t)/EEC(b)-2/ENP(b)/ENA(c) P1-L IJP(c) JH/GG

ACCESSION NR: AP5011525

UR/0020/65/161/005/1060/1062

AUTHORS: Gulyamov, K.; Lyakhovitskaya, V. A.; Tikhomirova, N.A.;
Fridkin, V. M. ^{4/2 4/1}

TITLE: Anomalous large effect of pressure on the optical and ferroelectric properties of SbSI single crystals ^B

SOURCE: AN SSSR. Doklady, v. 161, no. 5, 1965, 1060-1062 ²¹

TOPIC TAGS: antimony ²¹ compound, single crystal, ferroelectric property, pressure dependence, Curie point, electric field dependence

ABSTRACT: Earlier investigations of the optical and ferroelectric properties of SbSI single crystals and have lead to the conclusion that the coefficient dE_g/dp (E_g -- width of forbidden band, p -- pressure) has an anomalously large value. To check on this assumption, the authors have undertaken to determine dE_g/dp directly by measuring the shift of the edge of intrinsic absorption under the influence of hydrostatic pressure. The results, which are illustrated in Fig. 1 of the Enclosure, show that single crystals SbSI have

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L 58927-65

ACCESSION NR: AP5011525

an anomalously large shift of the edge of intrinsic absorption and of the Curie point with increasing pressure. The experimental results are qualitatively in agreement with the theory, and the previously observed shift of the absorption edge under the influence of an electric field can actually be related to the anomalously strong dependence of the width of the forbidden band on the pressure. This report was presented by A. V. Shubnikov. Original article has: 2 figures

ASSOCIATION: Institut kristallografi AN SSSR (Institute of Crystallography AN SSSR)

SUBMITTED: 27JAN65

ENCL: 01

SUB CODE: SS

NR REF SOV: 003

OTHER: 008

Card 2/3

L 58927-65

ACCESSION NR: AP5011525

ENCLOSURE: 01

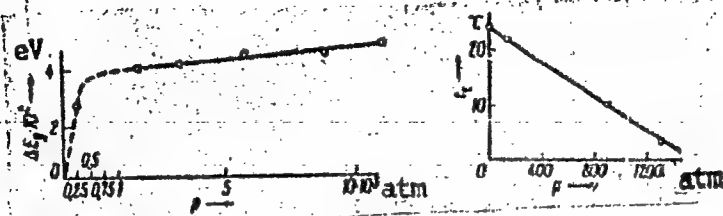


Fig. 1. Pressure variation of the width of the forbidden band (left) and of the Curie temperature (right) in single-crystal SbSI.

Card 3/3

L 44170-65 EEC(b)-2/EPA(s)-2/ENT(1)/ENT(m)/T/ENP(b)/ENP(t) IJP(c) AT/
JD/JG

ACCESSION NR: AP5008683

S/0077/65/010/002/0118/0123

AUTHORS: Pospelov, V. V. ; Fridkin, V. M.

TITLE: The problem of the mechanism of forming the photoelectret condition in monocrystals of certain halides of silver and of alkaline metals

SOURCE: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, v. 10, no. 2, 1965, 118-123

TOPIC TAGS: Studies of the ion adsorption mechanism and of the formation of hetero- and homopotentials in crystals of silver halides and halides of alkaline metals are presented. Experiments were performed with sodium and potassium chloride crystals of dimensions 10 x 10 x 1 mm and with silver chloride plates 15 x 15 x 0.5 mm in size. The experimental methods used were those described by P. S. Tartakovskiy (Vnutrenniy fotoeffekt v dielektrikakh, Gostekhteorizdat, M., 1960), by V. I. Bugrienko (Fizika tverdogo tela, 1962, 4, No. 11, 3152), and by V. F. Kiselev, V. V. Pospelov, and V. M. Fridkin (Zh. nauchn. i prikl. fotogr. i kinematogr., 1964, 9, 357). Measurements were made of the spectral distribution of adsorption and of direct ion flow for both the NaCl and KCl cases. The results were plotted as shown in Figs. 1 and 2 on the Enclosure. Similar measurements

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L 44170-65

ACCESSION NR: AP5008683

3
were plotted for AgCl spectra. Observed photopotentials and ion flow data are tabulated. The authors discuss the mechanism in relation to semiconductor technology. Credit is given to Z. B. Perekalina for her assistance with the experiments. Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Institut kristallografii AN SSSR i Fizicheskii fakul'tet Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Institute of Crystallography, AN SSSR, and the physics Department of Moscow State University)

SUBMITTED: 25Jun64

ENCL: 02

SUB CODE: SS, MM

NO REF SOV: 006

OTHER: 000

Card 2/4

L 52516-55 EWT(1)/EWT(m)/EEC(t)/T/EWP(t)/EWP(b)/EWA(c) Pz-6 IJP(:) JD/AT

ACCESSION NR: AP5010708

UR/0181/65/007/004/1037/1042

AUTHOR: Gulyamov, K.; Tikhomirova, N. A.; Fridkin, V. M.

TITLE: Effect of high hydrostatic pressure on the photoconductivity of CdS single crystals

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 1037-1042

TOPIC TAGS: cadmium sulfide, hydrostatic pressure, photoconductivity, nonequilibrium carrier, carrier lifetime

ABSTRACT: The purpose of the investigation was to make direct measurements of the lifetimes of the carriers as a function of the pressure, and to obtain simultaneously information on the influence of pressure on the adhesion levels. The authors measured both the stationary photocurrent and the phenomenological lifetime of single-crystal CdS in the pressure interval up to 15,000 atm, using the high-pressure chamber shown in Fig. 1 of the Enclosure. A standard test procedure was used. The theory underlying the determination of the true and phenomenological lifetimes of non-equilibrium carriers as functions of the pressure is briefly pre-

Card 1/3

L 52516-65

ACCESSION NR: AP5010708

2

sented. The test results show that the variation of the photoconductivity with pressure is due to changes in both the true and phenomenological lifetimes of the carriers. The information concerning the character of the carrier adhesion levels is not conclusive because of the narrow range of variation of the light intensity in the experiments. "The authors thank M. K. Sheynkman for valuable remarks." Orig. art. has: 4 figures and 5 formulas.

ASSOCIATION: Institut kristallografi AN SSSR, Moscow (Institute of Crystallography AN SSSR)

SUBMITTED: 19Sep64

ENCL: 01

SUB CODE: SS

NR REF SOV: 006

OTHER: 004

Card 2/3

L 52516-65

ACCESSION NR: AP5010708

ENCLOSURE: 01

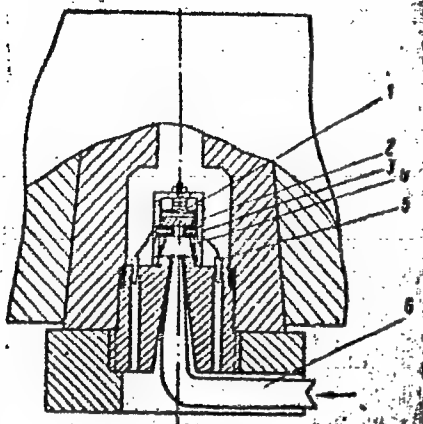


Fig. 1. Diagram of high-pressure chamber.

1 - Guard ring, 2 - crystal, 3 - silver electrodes, 4 - optical window made of quartz, 5 - electric leads insulated with polystyrene, 6 - light pipe.

LL
Card 3/3

L 9259-66 EWT(1)/EWT(m)/EPF(n)-2/EWA(d)/EWP(t)/I/EWP(k)/EWP(b)/EWA(c) IJP(c)
 ACC NR: AP5022712 JD/WW/HV/GG/AT SOURCE CODE: UR/0181/65/007/009/2723/2725
 44, 55 44, 55 44, 55 44, 55 83
 AUTHOR: Gulyamov, K.; Tikhomirova, N. A.; Turyanitsa, I. D.; Fridkin, V. M.
 44, 55
 ORG: Institute of Crystallography AN SSSR, Moscow (Institut kristallografii AN SSSR)
 TITLE: Photoconductivity of HgI₂ single crystals under high hydrostatic pressures
 SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2723-2725 18
 TOPIC TAGS: mercury compound, iodide, single crystal, photoconductivity, pressure effect, high pressure research
 21, 44, 55
 ABSTRACT: Photocurrent was studied as a function of pressure up to 17,000 atmospheres at room temperature in single crystals of HgI₂. Measurements were made on tetragonal single crystals (red mercuric iodide) grown from solution. Curves are given showing photocurrent as a function of incident wavelength for various hydrostatic pressures. The long-wave maximum corresponding to the fundamental absorption edge is shifted into the longer wave region as the pressure is increased. This maximum is located at 580 mμ ($E_g = 2.14$ ev) at atmospheric pressure. The change in energy with pressure conforms to the law $dE_g/dP = -(9 \pm 0.7) \cdot 10^{-6}$ ev/at. The photocurrent first decreases with pressure increase, passing through a minimum in the neighborhood of 700 atmospheres, and then increases with pressure up to 12,000 atmospheres. At about 13,000 atmospheres, a phase transition is observed which is accompanied by a drop in photo-
 Card 1/2

L 9259-66

ACC NR: AP5022712

current. Thus the minimum at 7000 atmospheres is not due to a phase transition and is apparently caused by a change in carrier lifetime. This hypothesis is used as a basis for a model explaining the complex relationship between photocurrent and pressure for this compound. Orig. art. has: 4 figures, 2 formulas.

SUB CODE: 20,07/

SUBM DATE: 01Apr65/

ORIG REF: 005/

OTH REF: 004

Card 2/2 *pw*

L 18766-66 EWT(m)/EWP(t) IJP(c) JD

ACC NR: AP6003777 SOURCE CODE: UR/0181/66/008/001/0148/0151

AUTHORS: Nosov, V. N.; Fridkin, V. M.

ORG: Institute of Crystallography AN SSSR, Moscow (Institut kristallografi AN SSSR)

84
82
B

TITLE: Photoconductivity and lifetime of nonequilibrium carriers at the phase transition in SbSI

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 148-151

TOPIC TAGS: photoconductivity, antimony compound, ferroelectric material, forbidden band, semiconductor carrier, phase transition, electric conductivity, temperature dependence, activation energy, Curie point

ABSTRACT: This is a continuation of earlier work (DAN SSSR v. 161, 1060, 1965), where it was observed that the temperature coefficient of the change of the forbidden gap in SbSI has an anomalously large value near the phase transition point. In the present investigation the authors measured the temperature dependence of the electric con-

Z

Card

1/3

L 18766-66

ACC NR: AP6003777

ductivity, the photoconductivity, and photocurrent carrier lifetime in SbSI near the phase transition, and observed the anomalies occurring near the ferroelectric phase transition point. The crystals were grown from the gas phase in the form of needles. The electric conductivity and photoconductivity were measured along the two-fold ferroelectric axis, which coincided with the axis of the needle. The lifetime was measured by a standard pulsed light modulation technique. The measurements were made in vacuum in weak fields. The photocurrent was measured at the maximum crystal sensitivity. All quantities exhibited anomalous changes near the phase-transition point. The accompanying change in activation energy of the donor level amounted to -0.2 eV, which was three times larger than the width of the forbidden band. To check that the anomalies are indeed connected with the decrease in the activation energy, the temperature dependence of the electron lifetime was investigated near the phase transition, and likewise exhibited an anomalous increase near the Curie temperature. If the anomalies are attributed to the change in activation energy, it can be assumed that the effective mass and the carrier mobility remain unchanged. Theoretical calculations of the variation of the

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2/3

L 18766-66

ACC NR: AP6003777

2

measured quantity show agreement with experiment in the case of the conduction and dark current, but not in the case of the photocurrent. This disparity may be due to the fact that the lifetime measured was not the true one, but the phenomenological one. The authors thank V. A. Lyakhovitskaya for supplying the crystals and S. I. Volobuyeva for taking part in the measurements. Orig. art. has: 3 figures, 4 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 07Jul65/ ORIG REF: 002/ OTH REF: 004

Card

3/3506

L 21569-66 EWT(1) LIP(c) GG

ACC NR: AP6008751

SOURCE CODE: UR/0386/66/003/006/0252/0255

AUTHOR: Fridkin, V. M.

ORG: Crystallography Institute, Academy of Sciences, SSSR (Institut kristallografii Akademii nauk SSSR)

TITLE: Some effects due to electron-phonon interaction in phase transitions occurring in a semiconductor ferroelectric

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 6, 1966, 252-255

TOPIC TAGS: ferroelectricity, paraelectricity, semiconductor carrier, second order phase transition, Curie point, electron interaction, phonon interaction

ABSTRACT: This is a continuation of the author's earlier studies of ferroelectric phase transitions in semiconductors, especially of the $A_VB_{VI}C_{VII}$ type (Dokl. AN SSSR v. 161, 1060, 1965). In this paper it is shown that the presence of a relatively high density of nonequilibrium carriers in semiconducting ferroelectrics leads to several new effects which affect the behavior of the semiconductor near the phase transition region. It is shown in particular that a sufficiently high nonequilibrium-carrier density causes the Curie point to experience a shift whose magnitude and sign are determined respectively by the magnitude and sign of the constant. The latter can be determined from the relation $E_g \approx E_{g0} + aP^2$ by investigating the anomalies of the forbidden gap E_g or of the temperature coefficient dE_g/dT in the phase transition region.

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L 21569-66

ACC NR: AP6008751

These anomalies are considered separately for the case of a second-order phase transition and for the case of a second-order phase transition close to the Curie point. It is shown that in both cases the coefficients of the temperature and pressure variations of the width of the forbidden band experience finite discontinuities whose signs and magnitudes are determined respectively by the sign and magnitude of some constant. This agrees with experimental results by T. Mori et al. (J. Phys. Soc. Japan v. 20, 281, 1965), although the numerical value of the constant was not estimated from these measurements. Author thanks I. M. Lifshits for reviewing the manuscript and for a discussion, and R. A. Suris and A. P. Levanyuk for numerous remarks. Orig. art. has: 12 formulas.

SUB CODE: 20/ SUBM DATE: 03 Feb66/ ORIG REF: 004/ OTH REF: 004

Card

2/2 ULR

ACC NR: AP7001342

SOURCE CODE: UR/0386/66/004/011/0461/0464

AUTHOR: Fridkin, V. M.; Gorelov, I. M.; Grekov, A. A.; Lyakhovitskaya, V. A.; Rodin, A. I.

ORG: Institute of Crystallography, Academy of Sciences SSSR (Institut kristallografi Akademii nauk SSSR)

TITLE: Phase boundary in ferroelectric SbSI as the analog of an electric domain in a semiconductor

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 11, 1966, 461-464

TOPIC TAGS: semiconductor single crystal, antimony compound, ferroelectricity, domain boundary, phase boundary

ABSTRACT: This is a continuation of earlier work (Dokl. AN SSSR v. 169, no. 4, 810, 1966) where a new optic method of observing the phase transition in single-crystal SbSI was reported. The method was used in the present work to trace the motion of the phase boundaries in SbSI crystals grown from the gas phase in the form of needles ($1 \times 0.1 \times 7$ mm). The needle axis was the c axis of the crystal. The observation was made in transmitted light through parallel pinacoid (100) faces in a direction perpendicular to the c axis. The tests showed that a constant electric field applied to the crystal causes the interphase boundary to move toward the cathode at a rate 10^{-3} cm/sec. Under certain experimental conditions (in the presence of a temperature gra-

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ACC NR: AP7001342

dient in the absence of an external field), undamped oscillations of the interphase boundary were observed, accompanied by electric oscillations in the external circuit of the crystal. It is shown that the observed displacements are connected with motion of ferroelectric regions in the crystal, analogous to the motion of electric domains in a semiconductor. While this analogy does not fully determine the concrete mechanism or the direction of motion of the interphase boundary, it does provide an explanation for both the motion itself and its oscillations. It is also shown that the period of the oscillations agrees with the value that would follow from the Maxwell time constant for SbSI. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 09Sep66/ ORIG REF: 004/ OTH REF: 004

Card 2/2

ACC NR: AP6015494

SOURCE CODE: UR/0101/66/008/005/1620/1621

AUTHOR: Verkhovskaya, K. A.; Fridkin, V. M.

63
B

ORG: Institute of Crystallography, AN SSSR, Moscow (Institut kristallografi AN SSSR)

TITLE: On the anomalous temperature shift of the intrinsic absorption edge of BaTiO₃ single crystals in the phase transition band

SOURCE: Fizika tverdogo tela, v. 8, no. 5, 1966, 1620-1621

TOPIC TAGS: absorption band, absorption edge, crystal absorption, barium titanate, forbidden band, forbidden zone width

ABSTRACT: The purpose of this study was to investigate the behavior of the intrinsic absorption edge of BaTiO₃ in the transition from the ferroelectric (tetragonal) to the paraelectric (cubic) phase. Five specimens of BaTiO₃ single crystals (Curie point $\theta = 105^\circ\text{C}$, forbidden band width $E_g = 3.2$ ev at room temperature) were investigated on a Sf-4A spectrophotometer. It was found that in the ferroelectric and in the paraelectric phases there exists a linear relationship between the width of the forbidden band E_g and the temperature with an equal coefficient, namely

$$\frac{dE_g}{dT} = -(7 \pm 0.5) \cdot 10^{-4} \text{ ev/deg}$$

Card 1/2

ACC NR: AP6015494

Near 105°C there is a phase shift, accompanied by an anomalous decrease of the width of the forbidden band. A temperature hysteresis with a width of the hysteresis loop of ~2°C was also observed. It appears that the change of the width of the forbidden band is related to the behavior of the heat capacity of BaTiO₃ in the phase transition band. The authors thank Dr. Arend who made the BaTiO₃ crystals available for the experiments. Orig. art. has: 1 figure.

SUB CODE: 20/

SUBM DATE: 18Nov65/

ORIG REF: 003/

OTH REF: 001

Augm
Card 2/2

L 38892-66

EWI(1)/EWI(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AF6018559

SOURCE CODE: UR/0181/66/008/006/1907/1909

AUTHOR: Fridkin, V. M.; Gulyamov, K.; Iyakhovitskaya, V. A.; Nosov, V. N.; Tikho-
mirova, N. A. 82

ORG: Institute of Crystallography, AN SSSR, Moscow (Institut kristallografi AN SSSR)
 TITLE: Anomaly of optical properties of ferroelectric SbSI in the phase-transition
 region

SOURCE: Fizika tverdogo tela, v. 8, no. 6, 1966, 1907-1909

TOPIC TAGS: antimony compound, phase transition, Curie point, ferroelectric property,
 forbidden band, pressure effect, paraelectricity, electron interaction, phonon inter-
 action, temperature dependence, absorption edge, *optic property*

ABSTRACT: This is a continuation of earlier work (DAN SSSR v. 161, 1060, 1965), where
 an anomalously large shift of the intrinsic-absorption edge was observed in SbSI
 single crystals with increasing pressure. The present study is devoted to a more de-
 tailed investigation of this shift, and discloses that the anomaly appears only in the
 vicinity of the phase transition. The authors measured the dependence of the width of
 the forbidden band E_g on the hydrostatic pressure p and the temperature T in the phase-
 transition region. The crystals were grown from the gas phase, the width of the for-
 bidden band was determined by measuring the shift of the maximum of the photocurrent,
 and the high pressure was produced with apparatus described elsewhere (FTT v. 7, 4,
 1965). The pressure was measured with a resistance manometer and the temperature was

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L 04787-67 EWT(1)/EWT(m)/EWP(c)/ETI IJP(c) JD/KW/AT

ACC NR: AP6024469

SOURCE CODE: UR/0181/66/008/007/2084/2086

AUTHOR: Gulyamov, K.; Tikhomirova, N. A.; Turyanitsa, I. D.; Fridkin, V. M.

ORG: Institute of Crystallography, AN SSSR, Moscow (Institut kristallografii AN SSSR)

TITLE: Photoconductivity of SbI_3 and BiI_3 single crystals at high hydrostatic pressures

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2084-2086

TOPIC TAGS: photoconductivity, spectral distribution, antimony compound, bismuth compound, iodide, forbidden band, pressure effect, carrier lifetime, electron recombination

ABSTRACT: Rhombohedral crystals were grown from the gas phase in the form of plates measuring 0.1×0.5 cm and their photoconductivity was investigated at pressures up to 14,000 atmospheres at room temperature. The measurements were made in a high-pressure multiplier using a procedure described earlier (FIT v. 7, 1037, 1965 and earlier). The tests yielded plots of the spectral distribution of the photocurrent, the variation of the width of the forbidden gap with pressure, and the pressure dependence of the relative density of the dark current. The tests have shown that the maxima of the spectral distribution of the photocurrent shifts toward longer wavelengths for both crystals. The pressure dependence of the photocurrent was also measured. In SbI_3 a strong increase in the photocurrent is accompanied also by an increase in the dark current, whereas in BiI_3 the dark current decreases under pressure.

Card 1/2

25210. FRIDKIN, V. YA. Kapillyarnaya Set' Legkogo I EE Vliyanie Na Kharakter Rentgenovskogo Izobrazheniya Legkikh. Terapevt. Arkhiv. 1949 Vyp 4.S. 30-32.

SO: Letopis' No. 33, 1949

"Capillary Network of the Lungs and Its Effect on the Character of the X-Ray Picture of the Lungs," Terap/ Arkhiv., No.4, 1949

Central Sci. Res. Inst. Roentgenology and Radiology im. V.M.Molotov

FRIDKIN, V.Ya.; ZHISLINA, M.M.

Certain characteristics of the X ray picture of lobar atelectasis.
Vent.rent.i rad. no.5:14-20 S-0 '53. (MLRA 7:1)

1. Iz kafedry rentgenologii (zaveduyushchiy - professor Yu.N. Sokolov) Tsentral'nogo instituta usovershenstvovaniya vrachey na baze bol'nitsy im. S.P.Botkina (nauchnyy rukovoditel' - zasluzhennyy deyatel' nauki professor S.A.Reynberg).
(Lungs--Collapse) (X rays)

FRIDKIN, V.Ya.

FRIDKIN, V.Ya., dots.; RYBAKOVA, N.I.

~~Roentgenanatomical~~ comparison of bronchial and pulmonary changes
in primary lung cancer [with summary in English]. Vop.onk. 3 no.4:
430-434 '57. (MIRA 10:11)

1. Iz 2-y kafedry rentgenologii i meditsinskoy radiologii (zav. -
prof. Yu.N.Sokolov) TSentral'nogo instituta usovershenstvovaniya
vrachey (dir. - V.P.Lebedeva). Adres avtorov: Moskva, TSentral'-
nyy institut usovershenstvovaniya vrachey.

(LUNG NEOPLASMS, diagnosis,

x-ray & anat. changes in lungs & bronchi, comparison (Rus))

^{DOL}
FRIDKIN, V. Ya., ~~Doc~~ Med Sci -- (diss) "Data for
~~an~~ X-ray study of the blood system of the lungs."

Mos, 1958, 21 pp (State Sci Res Roengeno-Radiology
Inst, ^{Moskva} RSFSR) 150 copies (KL, 28-58, 109)

- 71 -

FRIDKIN, V.Ya.; ROZENSHTRAUKH, L.S.

Bronchial tree in lobar and zonal atelectasis and pulmonary cirrhosis.
Vop.onk. 5 no.10:425-431 '59. (MIRA 13:12)
(LUNGS—COLLAPSE) (PULMONARY FIBROSIS)
(BRONCHI)

FRIDKIN, V.Ya.; GEL'SHTEYN, V.E.; ORLOV, V.H. (Moskva)

Electrocardiography in the diagnosis of lung cancer and mediastinal tumors. Klin.med. 37 no.8:106-112 Ag '59. (MIRA 12:11)

1. Iz pervoy kafedry rentgenologii i meditsinskoy radiologii (zav. - zasluzhennyy deyatel' nauki prof.S.A.Reynberg) i pervoy kafedry terapii (zav. - deystvitel'nyy chlen AMN SSSR prof.M.S. Vovsi) Tsentral'nogo instituta usovershenstvovaniya vrachev (dir. V.P.Lebedeva) na baze Bol'nitsy im. S.P.Botkina (glavnyy vrach - prof.A.N.Shabanov).

(LUNG, neoplasms)

(MEDIASTINUM, neoplasms)

(ELECTROCARDIOGRAPHY)

ROZENSHTRAUCKH, L.S.; SOKOLOV, Yu.N.; FRIDKIN, V.Ya. (Moskva)

On a unified nomenclature for the bronchial and vascular systems
of the lungs. Vest.rent.i rad. 34 no.6:3-11 N-D '59.

(MIRA 13:5)

(LUNGS anat. & histol.)

SHEKHTER, I.A., prof.; FRIDKIN, V.Ya., doktor med.nauk

"Bronchiography" by IU.N. Sokolov, L.S. Rozenshtraukh. Reviewed by
I.A. Shekhter, V.IA. Fridkin. Vest. rent. i rad. 35 no. 2:88-90
Mr-Apr '60. (MIRA 14:2)
(BRONCHI—RADIOGRAPHY) (SOKOLOV, IU.N.) (ROZENSHTRAUKH, L.S.)

FRIDKIN, V.Ya.; ZHISLINA, M.M.; GEL'SHTEYN, V.Ye.

Acute pulmonary edema; clinical roentgenological comparisons. Khim.
med. 38 no.5:72-80 My '60. (MIRA 13:12)
(PULMONARY EDEMA)

FRIDKIN, V.Ya. (Moskva, Pyatnitskaya ul., d.49, kv. 25)

Radiographic picture of the small and minute pulmonary blood vessels.
Vest. rent. i rad. 36 no. 1:28-33 Ja-F '61. (MIRA 14:4)
(LUNGS—RADIOGRAPHY)

FRIDKIN, Veniamin Yakovlevich; BENTSIAKOVA, V.M., red.; KOROLEV,
A.V., tekhn. red.

[Anatomicofunctional foundations of the X-ray picture of
the lungs] Anatomo-funktsional'nye osnovy rentgenologicheskogo
izobrazheniia legkikh. Moskva, Medgiz, 1963. 189 p.
(MIRA 16:11)

(LUNGS--RADIOGRAPHY)

FRIDKIN, V. Ya., doktor med. nauk

Review of L.S. Rozenshtraukh and N.I. Rybakov's book "Clinical
X-ray diagnosis of paragonimiasis." Vest. rent. i rad. 38
no.5:74-75 S-0'63 (MIRA 16:12)

MASLOV, Yuvenaliy Aleksandrovich; FRIDKIS, Z.I., retsenzents; BOGOSLAVETS,
N.P., tekhn.red.

[Air and electric-arc metal cutting] Vozdushno-elektrodugovaia
reaktsiya metallov. Moskva, Mashgiz, 1962. 103 p.

(MIRA 15:5)

(Electric metal cutting)

VAYNER, Sh.A., inzh.; VAYNER, S.A., inzh.; USOL'TSEV, V.A., inzh.;
FOKIN, V.M., inzh.; SOTSKOV, N.I., inzh.; ZANDBERG, S.A., inzh.;
SIGAREV, V.S., inzh.; BRONSHTEYN, L.M., inzh.; YUNGER, S.V., kand.
tekhn. nauk; BATYREV, A.V., inzh.; BODYAKIN, Yu.F., inzh.;
RYZHKOV, N.I., inzh.; YAKHNIN, A.L., inzh.; FRIDKIS, Z.I., inzh.

Furnishing the SGU gas-cutting machine with a FOS-4 scale
photocopying control system. Svar. proizv. no.9:34 S '65.

(MIRA 18:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut tekhnologii
mashinostroyeniya (for Sh.Vayner, S.Vayner, Usol'tsev, Fokin,
Sotskov). 2. Volgogradskiy zavod im. Petrova (for Zandberg,
Sigarev, Bronshteyn). 3. VPTI khimnefteapparatury (for Yunger,
Batyrev, Bodyakin). 4. Ural'skiy zavod tyazhelogo mashinostroyeniya
imeni Sergo Ordzhonikidze (for Ryzhkov, Yakhnin, Fridkis).

FRIDLAND

see also FRIDLYAND